DOCUMENT RESUME

ED 066 225 24 PS 005 888

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TITLE Learning Abilities of the Prekindergarten Child. Final Report.
INSTITUTION Oregon Univ., Eugene.
SPONS AGENCY National Center for Educational Research and Development (DHEW/OE), Washington, D.C.
BUREAU NO BR-2-J-007
PUB DATE Jun 72
CONTRACT OEC-X-72-0006(057)
NOTE 94p.

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS Age Differences; *Child Development; *Cognitive Processes; Comparative Analysis; Data Analysis; Early Childhood Education; *Evaluation Methods; *Learning Readiness; Learning Theories; *Preschool Children; Research Projects; Sex Differences; Testing
IDENTIFIERS KELP; *Kindergarten Evaluation of Learning Potential

ABSTRACT

The purpose of this study was to collect data from which the cognitive processes of the prekindergarten child could be analyzed. The study population consisted of 53 subjects, 3-1/2-4-1/2 years old. Kindergarten Evaluation of Learning Potential (KELP) was used to obtain data. The learning theory on which KELP is based postulates associative, conceptual and creative self-direction levels of learning. The study ran for 12 weeks. Each subject interacted with KELP approximately 20 minutes daily. It was hypothesized there would be no significant difference in the three levels of learning between (1) boys and girls in the experimental groups; (2) younger and older children in the experimental groups; and (3) kindergarten and prekindergarten children. There was significance at the .01 level between: (1) boys and girls in associative learning; (2) younger (3-1/2 - 4 years) and older (4 - 4-1/2 years) children in associative and conceptual learning; and (3) kindergarten and prekindergarten children in all levels of learning. This study indicates the ability to conceptualize preacademic skills is significantly better established at 4-1/2 years than at 4 years. This conclusion supports Piaget's theory that children develop the ability to generalize at about age 4. (Author)

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Final Report

Project No. 2-J-007
Grant No. OEC-X-72-0006(057)

Learning Abilities of the Prekindergarten Child

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Eugene, Oregon

June, 1972

The research reported herein was performed pursuant to a grant with the Office of Education, U. S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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CHAPTER I

STATEMENT OF THE PROBLEM

Introduction

Preschool education has recently become a national concern, particularly for young children whose home experience is thought to be inadequate. Despite extensive planning for projects such as Head Start and Follow Through, resolutions as to the kinds of experiences which are most valuable for the child prior to his entrance into first grade have not been ascertained. As a result, several instructional models for Early Childhood experience have been implemented. These models provide that different concentrations of children's time be given to free play vs. structured tasks, academic vs. social learning, language vs. perceptual training, school readiness vs. the children's garden, community needs vs. individual needs, physical vs. mental development and cognitive vs. affective learning. Many programs are based on the philosophical ideals of the programmers rather than on research evidence of how learning takes place. Data are needed, not only on the level of competence of prekindergarten children, but also on what children of given ages can achieve with satisfaction and pleasure.

Questions remain unanswered concerning the nature of learning that is possible at the prekindergarten age with reference to associative versus conceptual processes. Studies are needed to identify possible differences between boys and girls in different cognitive abilities. More effective programs can be designed only after questions such as these have been answered.

Some recent research has indicated that children learn much more than has previously been assumed from evaluation of developmental programs. In recent years, developmental theorists have formed conclusions which have been utilized in only a limited number of curriculums. Inhelder (1962) has noted certain differences between the results of longitudinal studies and results obtained by methods which relied on short term observation in relationship to reasoning. When the child is given a series of reasoning tests, a tendency to homogeniety and generalization is noted in his reasoning behavior which, although slight in the course of the formation of a structure, manifests itself more clearly when the structure has been achieved. Inhelder concludes this would indicate the exposure to a variety of experiences would give the child a broader base of knowledge and open the door to cognitive achievements at a younger age than has previously been assumed.

As a developmental theorist, Piaget has greatly influenced the trends of thought in childhood education. He was the first to describe

the stages through which young children develop their intellectual structure of the world. Piaget (1969) defines these periods as Sensorimotor Stage, Preoperational Thought, Concrete Operations and Formal Operations. The transition from one stage to another is determined by the mode of cognitive operation the individual utilizes. The sensorimotor intelligence period, from birth to about two years of age, is characterized by the organization of spatial relationships, the organization of objects and a notion of their permanence, and the organization of causal relationships. In the second period, called preoperational thought, starts at about age two, the child is capable of having representational thought by means of symbolic function. The third period, called concrete operations, begins at about age seven or eight and is characterized by the inception of operations. Piaget defines operations as internalized actions which are reversible, and a child in the concrete operations period is unable to perform operations, but is forming schemata which will develop into operations. The fourth period, called formal operations, begins at about eleven or twelve years of age and is characterized by formal or propositional operations. Piaget's developmental theory is based on a fluid, dynamic cognitive process which unfolds in a predetermined, sequential manner.

Piaget (1952) described the functioning, early in the preoperational period, when a child's transductive reasonings proceed

from the particular to the particular. The child cannot proceed from the particular to the general, as in inductive reasoning; or from general to the particular, as in deductive reasoning; because he is reasoning without understanding the relationship of the part to the whole. Piaget stated generally a child is unable to move beyond transductive reasoning before the age of four, as he is unable to conceptualize before this time. This study encompassed the age range in which Piaget observed symbolic conceptualization became possible.

Hofstaetter (1954) did a factorial analysis of longitudinal data of the California Growth Studies. He identified differentiated learning peaks at 8 months, 2.7 years and 9 years. He found that variance in measures of intellectual growth could be accounted for by three factors. Hofstaetter labeled Factor I, which peaks at about 8 months, as Sensorimotor Alertness; Factor II, which peaks at about 2.7 years, as Persistence; and Factor III, which peaks at about 9 years, as Manipulation of Symbols. Factor III was negligible until 1.9 years, with the loadings rising rapidly from 0.68 at 4 years to 0.90 at 6 years. The fact of the long period of emergence of Factor III indicated a different cognitive process than those measured by Factors I and II. Wallace (1967) interpreted the peak ages Hofstaetter identified as verification of Piaget's developmental

stages. At the present time little is known about the kinds of learning children do best at these peak ages.

Golden (1969) in a longitudinal study of 89 black children added support to Hofstaetter's findings. The same pattern of differentation in cognitive development emerged during the third year of life. Ball (1970) also noted evidence of three and four year old children showing "types" of cognitive abilities in a study concerning divergent production, convergent production and cognitive processes. One interpretation from these studies is that particular kinds of cognitive learning may occur more effectively at particular ages.

The learning potential of the young child has received attention in recent years. Many educators consider learning as a continuous process in the child's development, with new learning rooted in and affected by previous and early learning. (Frost, 1968.) Mukerji (1968) considered the logic of utilizing the educational potential of the early years as self-evident in regard to continuous learning. Bloom (1964) and Cicarelli (1969) studied the pace of learning at different ages in children. Bloom reported half the variance in IQ measurement at age 17 is already present at age 4. Cicarelli concluded that 80-90% of brain development is complete by age 5. Bruner (1971) suggested our educational techniques be more aligned with the findings which indicate that the period of most rapid growth, both mental and physical, takes place during the first five years of

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life. All of these investigators are concerned with expanding the assumed boundaries of cognitive capacities during the early years of the child's life. Utilizing the research on learning, many educators now agree that some form of early childhood education is necessary for the full development of young children.

At the present time the function of the nursery school is day care rather than a program of planned experiences focused on cognitive development. This prekindergarten setting is the apt place to explore the extent to which children organize their experiences into concepts. This is also the opportune time to define the kinds of learning the child from two to four uses to organize their sensory experience. Current knowledge implies that each child should, at an early age, be provided with opportunities for individualized programs of personal, social, intellectual and physical development.

With these concerns in mind the following questions are posed: Is it possible to identify the cognitive processes of the four-year-old child (42-54 months)? Is there a difference in cognitive processes between boys and girls of this age?

Hypotheses

The purpose of the study was to analyze the cognitive processes of the four-year-old children in preschool settings. The following hypotheses were tested.

1. No significant differences exist between male and female prekindergarten children in association learning, in conceptualization or in creative self-direction.

2. No significant difference exists between younger (3 1/2-4 years) and older (4-4 1/2 years) children in associative learning, in conceptualization or in creative self-direction.

3. No significant difference exists between prekindergarten and kindergarten children in learning at association, conceptual or creative self-direction levels.

Definition of Terms

Following are specific meanings of terms used in this investigation.

Association Learning refers to that learning which is characterized by the addition of bits of knowledge or awareness to an existing chain of information or sensitivities; learning that results when bits of information are linked together because they occur together in time.

Conceptualization is the process of grasping the inherent relationships between association systems; the process of abstracting commonality.

Creative Self-direction refers to that learning that is controlled by the learner and involves the formulation or creation of new interpretations from previous associations or conceptualizations.

Preprimary Skills refers to certain academic skills which are basic to successful functioning in a typical first grade class. Skills taught and evaluated in this study were left to right sequence, auditory and visual discrimination, color identification and numeral identification.

Organization of the Research Report

Chapter II discusses literature that deals with cognitive style of young children, possible sex differences and existing curricula at the prekindergarten level. Chapter III describes the design and procedures used in carrying out the research. Chapter IV presents the results. Chapter V includes a summary, the conclusions, some implications of the findings and suggests further research.

Summary

The level of a cognitive functioning for an individual is determined by the organization and interpretation of sensory input. Evidence indicates the modes of cognitive organization and interpretation of sensory input develop in a sequential manner during the lifetime of the individual. The most rapid development is concentrated in the years from birth to five.

Although general relationships have been established between experiences and learning, there is a lack of specificity to enable

teachers to develop appropriate prekindergarten curricula. Once specific relationships have been established and evaluated, experiencial and instructional programs for young children may become more widespread.

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter reviews previous research on prekindergarten education which is relevant to the current study. The literature selected has been categorized as 1) cognitive processes, 2) sex differences in cognitive processes, and 3) prekindergarten curriculum.

Cognitive Processes

Some of the published research concerned the kinds of learning which children are able to do. These studies included associative and conceptual learning, creativity as a cognitive process and intervention programs at the preschool level.

Cognitive theorists, such as Piaget, view the learner as having an active role in organizing and structuring the sensory input he receives from his environment. Conceptualization is viewed as an internal process of selecting and structuring sensory input from his environment which allows the child to organize his learning. Some theorists depart from Piaget's emphasis on chronological age as the important predictor of cognitive functioning and

focus on the experiences that are basic to particular conceptualizations.

Two recent studies seem to suggest learning is more effective when instruction is specific to the objective and comparatively free of complexity of expectations. Schutz (1969) conducted a study with 60 four-year-old Head Start children to assess the value of teaching young children the attributes of concept and the conceptual rules by which these attributes are organized. It was hypothesized that only if children had prior knowledge of both attributes and rules could they follow instructions for learning a new concept. It was further hypothesized that children who learned to follow instructions involving a rule would be superior at discovering this rule in a concept-identification situation. Results of pre- and posttesting the children's ability for concept-utilization and concept-identification indicated that experimental groups performed better than the control group if, and only if, the children had learned both attributes and rules before or during the experiment. Transfer of the new rule to the concept identification problem was demonstrated by the group learning the rules, but not by the group learning both rules and attribute. A possible interpretation of these results could be that the focus on both rule and attribute presented the child with a learning situation which was too entropic. The quantity and complexity of the

input served as noise to his internal system for structuring input, thus jamming and distracting cognitive processes. The subjects learning only the rule encountered less entropy, thus were able to centrate on learning the rule rather than on discriminating and organizing the input simultaneously.

In an investigation of concept learning in young children, Ginsberg (1969) conducted three studies of the understanding of "more than" by preschool children. The experimental groups consisted of children of three age groups: 54-66 months, 41-51 months and younger subjects with a mean age of 38 months. Concept learning in all age groups was most effective when the concept was introduced in a simple context. This result would tend to support the conclusion that learning is most optimal when instruction is specific and relatively free of distractors.

Many studies have focused on different kinds of intellectual functioning in young children. Hooper (1969) used a population of middle class nursery school children to study label-classification, discriminatory-memory and seriation. These three stages in cognitive behavior were assumed to exemplify the concrete operations period of Piaget's developmental theory. Hooper's results of post-test and transfer tasks support the relationship of age and maturational components in cognitive development.

Baptiste (1969) attempted to accelerate the ability of preschool children to conserve quantity by direct instruction. He developed an "equilibrated methodology" using classification by attribute, seriation and reversibility as the experimental treatment. In his nursery school population a significant difference was found in favor of the group which received instructions in the Piagetian operations. A possible conclusion which could be drawn from these findings would be that systematic, direct teaching leads to positive results.

Cooke (1971) studied the effect of different interaction strategies on the cognitive processes of first grade children. In a study of conceptualization he designed sequences of attribute blocks by which children could build, by association, patterns which also followed an imbedded principle. In interacting with the children he focused on 1) matching the attributes to duplicate the design, 2) telling the principle on which the design was organized or 3) discovering the organizing principle through inquiry. Cooke found that a guided discovery technique in contrast to rote or principle techniques produced better initial results, which were sustained or improved over long periods of time. A possible interpretation of these findings could be threefold: 1) attention to attributes apparently distracted learners from their own discovery of the inherent design, 2) when told the organizing principle the child did not experience the process of constructing the relationship, in which case possible internalization of the concept

occurred immediately or not at all, and 3) in experiencing the discovery, the child learned the process of constructing the relationship and internalized it, having it as a foundation to improve his performance over an extended period of time without further instruction.

Creativity has also been studied as a cognitive process. Lichtman (1971) examined the relationship of the variables of intelligence, creativity and language skills in preschool disadvantaged black children. The results supported his hypotheses: 1) the specific components of each variable had higher correlations within each variable than between variables and 2) each variable loaded on a different factor. One of the major implications drawn from this study is creativity can be measured on a separate dimension from language skills and verbal intelligence in preschool disadvantaged black children.

Busse (1971) examined the effects of play-like, verbal feedback and nonverbal feedback on three creative ability measures with 175 lower socioeconomic preschool children. The creativity measures were found to be largely unaffected by variations in testing conditions. One conclusion which could be drawn from the Busse and Lichtman results is that the cognitive process of creativity is a basic operation whereas verbal intelligence and language skills are learned operations.

Pre-reading skills are of prime concern in early childhood education and especially so in the intervention programs. The

controversy surrounding beginning reading has often centered on the age at which instruction should begin. Jester (1971) hypothesized that by the time a child reaches 5, 6 or 7 it is too late for optimum development of reading readiness. Varying amounts of systematic intellectual stimulation over a period of time were provided groups of infants. At 3 years of age each was administered the Stanford-Binet Intelligence Test. Factor analysis revealed three relatively clear and independent factors contributed to the scores: language, memory and perceptual-motor variables. Significant differences in scores were noted as a function of time and continuity in the stimulation program for the language and memory factors but not for the perceptual-motor variable. It was concluded 1) intervention with systematic intellectual stimulation contributes to higher intelligence scores in children, and 2) the time to begin instruction in beginning reading skills is at a child's birth. A further interpretation of Jester's study might be that sensorimotor development had peaked in the first two years of life, therefore the motor training was not significant in children beyond 3 years of age. This study supports Hofstaetter's (1954) identification of ages of optimum learning in different areas of cognitive development.

Nedler (1970) examined three programs of early intervention designed specifically for the Mexican-American child. Three groups, each involving 16 three-year-old children, were involved in a

program conducted over an academic year. The first group of children were exposed to sequenced instructional activities. Five training areas were stressed: 1) visual skills, 2) auditory skills, 3) motor skills, 4) English language skills, and 5) problem solving and reasoning skills. The parents of children enrolled in the second group met regularly with staff members to focus on health, nutrition and education of the children. Their goal was to raise the intellectual performance of the children through an indirect approach designed to affect the behavior of the parents. The third group attended a day care center where they could develop at their own rate through interaction with other children. The programs were evaluated by a nonverbal IQ test and a measure of the child's receptive language functioning. Children enrolled in the first group program showed significant gains in IQ over the comparison groups.

In a year long intervention program involving 1800 disadvantaged preschool children DiLorenzo (1969) reported on factors which the participating schools considered major objectives of their programs. These were intelligence, language, self-concept and physical development. Analysis of pre- and posttests revealed that cognitive programs were able to close some of the gap between disadvantaged and advantaged children; however, the difference which remained exceeded the difference overcome. It appears that

Nedler's program, which placed priority on instruction to attain cognitive gains brought the children nearer to an attainment level of advantaged children than did programs which aimed at less defined and broader goals.

Sex Differences in Cognitive Processes

Some of the investigations of the cognitive development in children separated the performance of boys and girls. Baptitse studied Piagetian stages of concrete operations and found no significant difference between sexes. He concluded the cognitive ability to conserve quantity and the ability to respond to the instructional technique did not differ between boys and girls.

Alexander (1968) studied sex differences in language development among children growing up in the deprived conditions of a large city. The vocabulary range of 128 three and four-year-old children was examined throughout the Head Start school year. Alexander used the Picture Vocabulary Test of Stanford-Binet Intelligence Scale as a pre- and posttest. Results showed more boys than girls equal to or above age norms for vocabulary development at the beginning of the study. Although a significant change in vocabulary over the school year was evident from the two scores, the relative difference between sexes was maintained. Alexander's

conclusion was that the Head Start experience did not contribute to the sex differences in language development.

Remediation in language and cognitive skills of 163 disadvantaged children was discussed in the 1968-69 Final Report of the UCLA Head Start Research and Evaluation Center. A comparison was made of three language programs, the UCLA Preschool Language Program, the Behavioral Research Laboratories' Readiness for Language Arts Program and an unstructured placebo program. Four-year-old children were pre- and posttested on the Peabody Picture Vocabulary Test, the Caldwell Preschool Inventory, the Gumpcookies, the Behavioral Research Laboratories' Test, the Visual Discrimination Inventory and the UCLA Early Childhood Language Test for Four Year Olds. Although the UCLA and the Behavioral Laboratories' Readiness programs differed in content, activities and materials, results showed a slight, but nonsignificant difference in favor of the female subjects (Edwards, 1969).

Suppes and Feldman (1969) of the Stanford University Institute for Mathematical Studies in Social Science conducted a study to determine to what extent 5-6 year old children comprehend the meaning of logical connectives. With an even distribution of the 176 sample population, no significant difference between sexes was indicated.

One conclusion which may be drawn from these studies is that no significant differences have been discovered between sexes

in cognitive development. Males and females can be expected to do equally well in experimental situations.

Prekindergarten Curriculum

The basis for planning a preschool curriculum is usually philosophical. Preschool programs generally can be classified according to one of the following categories: community controlled, socially oriented or pre-academic instruction. From more than 1500 Early Childhood Education programs in the United States, the ones selected for review provide a range of philosophical basis and identifiable concentration of the child's time.

Many preschool programs in recent years have evolved as a solution of a community need and are typically governed by a Board which represents various interested groups. In these cases, parental involvement is an integral part of the program. Such is the case in the Parent Participation Nursery School at Berkeley, California. The philosophy of this program is based on the premise that true learning takes place through the sequential process of 1) curiosity, 2) exploration, 3) discovery and 4) integration or synthesis of the concepts which have developed as a result of the first three steps. The responsibility of the staff is viewed as enabling the child to pursue his learning sequence through challenges of the

provided environment (Sullivan, 1968). Parental involvement is a vital factor in staffing of this center, and also in the curricular decisions.

The Integrated Nursery School in Detroit, supported by Wayne State University, has black and white children from all socioeconomic levels. The philosophical basis for this nursery school is to build positive self-concepts through enjoying, trusting and learning from each other, thus extending experiences and knowledge. This philosophy is carried beyond the nursery school by a parent involvement program which adds understanding not only of the nursery school and young children, but also understandings about themselves as gained from one another. Cross-cultural understandings and mutual respect are nourished as parents meet to deal with concerns for their children (Weber, 1970).

Nurseries in Cross-Cultural Education, San Francisco, and Bank Street Early Childhood Center, New York City, reflect both social learning and parent involvement in the educational process of the child. The theoretical position of the Nurseries in Cross-Cultural Education is one of personality being the mediator of learning; therefore the program is planned to give the child's personality full opportunity to develop. Since play is the child's spontaneous way of learning, the program is organized around play. Through play the child is learning to adapt to his culture and its symbolic insights

(Lane, 1967). Bank Street operates from a principle of educating all young children the same, for all theory is derived from the fields of child development and psychodynamic theories of personality development and are based on humanitarian principles. The curriculum thus encompasses developmental approaches including play and the support of the child's own strivings. The generalized goal for children and adults is to further the positive feelings of self and others, plus strengthening academic and social skills (Wagner, 1966).

Curricula emphasizing social development above cognitive development tend to be viewed as traditional rather than innovative (Weber, 1970). Programs of social orientation generally hold the conviction that physical and social needs are basic, therefore should receive a higher priority than pre-academic needs. A belief that a child is incapable of academic development before the age of 6 or 7 is added support to socially oriented programs. In the instances where these traditional views are held, programs emphasize social growth in a variety of ways. Outdoor education, with many and varied physical and social skills activities, is the heart of the curriculum at the University Nursery School at Stanford University (Dowley, 1969). The University of Chicago Nursery School also has a program of social orientation. The students are children of academically oriented parents and the school bases its philosophy

on the assumption that it provides the socialization which cannot be provided within the home (Jackson, 1968).

In the past two decades educators in this country have become increasingly concerned with the efficiency of our educational system. Eventually, this brought about a focus on early childhood education which capitalizes on optimal learning ages, permitting the child to exercise his cognitive capabilities. Although varying in emphasis, several programs reflect this pre-academic focus.

The Piaget-Derived Curriculum of the Ypsilanti Early Education Program in Ypsilanti, Michigan, involves both teachers and parents in the cognitive development of the child through parent education programs and a home-visit program. The parent education program is designed to help parents understand the Piagetian concepts and give them techniques which would extend the program into the home (Wittes, 1969). The home visitation program is an attempt to reach parents not attending the adult education sessions and to give tutorial sessions of techniques to facilitiate the curriculum (Plummer, 1969). Kamii (1970) studied at Geneva at the Institute of Sciences of Education with Piaget and Inhelder and utilized Piagetian theory to fashion a curriculum which emphasizes the child's active construction of mental images rather than passive association of words and pictures with real objects. Kamii concluded a curriculum which reflects an understanding of the nature of intelligence from

Piaget's biological perspective will define its long-term goals first and then proceed to conceptualize its short-term goals. Sonquist (1968) and Kamii state that cognitive content can develop through 1) manipulation of the environment to induce the child to discover the desired learning, 2) manipulation of the environment to make discovery inevitable and 3) direct teaching. They recommended all three approaches be used separately, in a sequenced order or simultaneously.

Perceptual experiences, which are considered basic for conceptual growth, are a primary component of the curriculum at the Pre-kindergarten Demonstration Center at Rochester, New York. Video-tape is utilized to evaluate both the curriculum and each child's growth (Weber, 1970). The utilization of film is also employed at the Educational Development Center of Newton, Massachusetts. At this center the film enables the teachers to evaluate the effectiveness of the curriculum, giving them the foundation to become active and forceful shapers of the learning environment (Koerner, 1967).

The directors of the New Nursery School at Greeley, Colorado state the curriculum is based on a combination of Montessori, O. K. Moore and Deutsch. The school is organized as an autotelic responsive environment in which the children are encouraged to enter into activity for its own sake and not to obtain

rewards or escape punishment. At the New Nursery the child is the sole determiner of his activities, as the adults do not 1) initiate conversation, 2) ask a child to give up one activity for another, 3) suggest the child listen to a story and 4) insist a child join a group activity (Nimnicht, 1967). Weber (1970) concluded an otherwise fine program lacked warmth and essential supportive relationships.

The major premise of the Early Childhood Language Project, UCLA, is the child's language must conform to the school system's expectations and become elaborated enough to aid in problem solving. Carefully structured language lessons are designed to compensate for measured areas in language deficiency of the disadvantaged child. Other than the assumption that competence in the area of language will automatically build self concept and esteem, aspects of growth are not included in this program (Stern, 1966).

The impetus for many current preschool programs stems from the desire to provide experiences in early education which will ensure greater success in later schooling. In these instances, efforts are made to develop a curriculum which will compensate for the deprivations of earlier years. One widely known compensatory program, which is academically oriented, was initiated by Bereiter and Englemann of the University of Illinois (1966). This curriculum is based on associative learning techniques and has met with much controversy.

Englemann has expanded this compensatory program to the elementary school level in an attempt to encompass all children. Kamii and Derman (1969) of Ypsilanti, Michigan, personally tested some children taught by Englemann at the University of Illinois Laboratory School. Englemann theorized that skills can be directly taught, including Piagetian constructs of conservation, specific gravity and judgment of speed. He taught children the rules related to these phenomena. Children were then asked to apply the verbally learned rules to observable phenomena. While the children used the rules well in some test situations, further probing revealed inconsistencies and limited understanding of the phenomena. The lack of sensorimotor roots of logical and physical knowledge was evidenced by the children's attempts to use the overlay of rules in ways unsupported by the data and by their resort to sensorimotor and intuitive modes of thinking. While the rules these children were taught seemed an expediency which gave immediate answers, well-grounded meaning was lacking for them (Weber, 1970). Only through long-term development of cognitive processes do logical and physical knowledge become integrated into the thought structure of the child for flexible, adaptive use.

William Martin (1960) commented on the effects of sensory deprivation on cognitive functioning. Without sensory experiences--external stimulation--the child has no way of checking, monitoring

or verifying his cognitive modes of the environment. To deprive the child of rich and constantly changing interaction with the world of things reduces him to the helpless state of depending upon the verbalization of others.

The diagnosis and prescription hypothesis underlies the early childhood enrichment programs directed by Martin Deutsch in New York City. Deutsch (1967) proclaims the need for the identification of the stimulation lacking in the environment; the diagnosis of the areas of retardation in cognitive development of the child; the prescription of particular stimuli, strategies and techniques for their presentation in order to accelerate the development of related functions; and the evaluation of the efficiency of the techniques are all tasks for compensatory programs. A variety of tests are used to identify the needs of children, and from this information programs are fashioned for each individual.

The review of pre-primary programs indicate a response to the perceived needs in each situation. Osler (1970) concluded from studies of lower class children 1) a deficit in discrimination learning and concept attainment and 2) no difference in the way lower and middle class children profit from instructional cues and generalize from discrimination learning to concept attainment. Osler proposed providing both enriched instruction or experience in discrimination learning to lower class children and experiences in problem solving

as effective means of eliminating deficits in concept attainment. A possible conclusion from his investigation indicates no significant difference in the ability of children to respond and achieve in comparable programs. A curriculum which answers not only social and pre-academic needs but also parental involvement would be supported by conclusions drawn from Osler's study.

Summary

A search of current literature indicates no universally accepted theory, philosophy, method or curriculum in Early Childhood Education today. Studies of cognitive processes generally support the generalization that direct teaching tends to enhance children's performance in the skills where the research is focused. Studies reveal little or no significant difference with regard to sex in performance, achievement, verbalization and cognitive processes, providing there initially is no significant difference between groups.

Curricula in Early Childhood Education can be classified as oriented to community, social or pre-academic needs. Curriculum in each instance is designed to reflect the perceived needs and priorities of the children involved at that particular center. Few curricular instances indicate equal emphasis being placed on any combination of community, social and pre-academic needs. In all instances it was noted the curriculum responded to the physical needs

of the child during the school day. The response to these physical needs necessitated routine similarities which are commonly shared by all programs. The non-routine portion of each program provided the unique quality for which it was selected in this review.

CHAPTER III

DESIGN OF THE STUDY

The current study was initiated for the purpose of analyzing the cognitive processes of prekindergarten children. A comparison between prekindergarten and kindergarten children at association learning, conceptualization and creative self-direction was made to analyze cognitive processes. A comparison within the study population was made to determine possible differences between sexes regarding cognitive processes.

In the execution of the study specific consideration was given to identification of the sample, selection of the instruments, training of the professional personnel and the collection and treatment of the data. This chapter provides background information regarding these procedures and describes the pilot study and comparison group.

Pilot Study

A pilot study was conducted for the purpose of perfecting training techniques to be used for training professional personnel in the teaching and observation techniques required by the proposed study.

The study director and pilot study personnel met for a two hour session prior to the introduction of material to the children and then weekly in conference and demonstration sessions. At the initial session the purpose and procedures of both the pilot study and the proposed study were presented. The material was introduced in a workshop setting where the participants interacted with the material while an explanation of its theory was presented and performance criteria were discussed. The weekly sessions were also of two hour duration, one hour being spent as a demonstration session involving children and one hour as a conference session involving professional personnel.

Kindergarten children at a local day care center were involved in the pilot study. The rationale was that strengthening teacher techniques was the goal, rather than on levels of achievement of the 15 children. The pilot study indicated a necessity for both a general pre-service and on-site inservice sessions. Participants in the pilot study also suggested weekly ancedotal records to increase reliability on observational reports.

The Sample

The sample for the study consisted of 53 children, 42-54 months of age, at four study sites. The age range of 3 1/2 to 4 1/2 was selected because it is 1) approximately one year younger than

children in a typical kindergarten and 2) within the age range which Piaget's developmental theory indicates conceptualization becomes possible.

Factors regarding identification of study sites include 1) range in socioeconomic status, 2) diversity of cultural background, 3) variability of programs in use and 4) adequate number of study population at each site.

Study site A was a day care center in Portland, Oregon. This center was chosen because 1) it served an inner city population identified as disadvantaged, 2) it was a Head Start project under parochial direction, and 3) it had a program oriented to physical and social development of the child. All 9 subjects at this location were black. Family income was derived from unskilled labor, welfare or charity. There was a high incidence of divorced or unmarried mothers.

Study site B was a day care-nursery school in Beaverton, Oregon. This center was chosen because 1) it served a middle class clientele, 2) it was both a day care and nursery school, 3) it had a program oriented to cognitive and social development of the child and 4) it was privately owned and operated. All 11 subjects at this location were white. Family income was derived from professional services, small businesses, skilled and semiskilled labor. Four of the eleven families at this site were not intact.

Study site C was a nursery school in Beaverton, Oregon. This center was chosen because 1) it was a part of an established, affluent private school, 2) it served an upper middle class clientele and 3) it had a program oriented to personality growth through both affective and cognitive stimulation. The subjects at this location consisted of one black and 14 white children. Family income was derived from professional services, executive positions and both large and small businesses. All but 3 families were intact at this center.

Study site D was a day care center located at a community college in Eugene, Oregon. The purpose of this facility was to serve as a training center for the Early Childhood Program and to meet the needs of the adult students attending the institution. This location was chosen because 1) it was a part of a public institution, 2) it served a college population and 3) it had a program oriented to physical, social and affective development of the child. Family income was derived from part-time employment at semi- or unskilled labor, welfare or charity. The subjects at this center consisted of one black, one Chicano and 16 white children. This site had an added factor of having a community of subjects not only influenced by aspirations of higher education but a low income from choice, for each subject had at least one parent attending the college. Thirteen

of the eighteen families representing the study population at this location were not intact.

Using Warner's Index of Status Characteristics the subject distribution was as follows:

Lower upper class		1.7%	
Upper middle class		5.3%	
	Total		7.0%
Lower middle class	Total		31.6%
Upper lower class		35.0%	
Lower lower class		26.4%	
	Total		61.4%

Warner (1952) states the student distribution in America is 60% lower class, 30% lower middle class and 10% upper middle and upper class. The sample obtained for this study was within the stated range of Warner's specified distribution as noted by the percentage totals in the above table.

Selection of Instruments

The need for two kinds of measures was determined. One instrument was needed which would not assume past learning and would provide a framework of opportunity for children to learn those skills on which they would be evaluated. A measure for intelligence quotient (IQ) was needed to verify that the mental age (MA) was comparable to chronological age (CA) and to compare achievement of children with traditional measures of IQ.

Kindergarten Evaluation of
Learning Potential

To explore abilities of prekindergarten children a learning system was needed which defined a level of achievement in a curricular situation at the kindergarten level. Kindergarten Evaluation of Learning Potential (KELP) by Wilson and Robeck (1967) defined these sequences in representative areas of the curriculum in terms of behavioral expectations.

The theory basic to KELP postulates three levels of learning: association, conceptualization and creative self-direction. At the association level a child copies, reproduces or imitates a model which is provided. The range of experiences provided with each item gives the child additional, but not necessarily repeated, experiences. Utilizing a broad base of association level experiences a child establishes physical experiences which he uses as a basis for conceptualization.

The second level of learning, conceptualization, is built on bits and pieces of sensory experience and is characterized by sudden insight. Conceptualization performance may stabilize to become an understanding of the relationships involved, or conceptualization may culminate a series of association experiences. The person involved in the learning sees the inherent structure, or grasps the relationships of the various parts in the learning situation.

The third level of learning is characterized by creativity involving purposefulness or self-direction. Both association and conceptualization levels have an aura of learning from another person, as though he were holding the answer book and deciding when the learning had been successful. On the creative self-direction level, the learning is characterized by outcomes which are inner directed and to some extent unpredictable. Teacher training involves the ability to make the discriminations of these levels of learning in the observational reports.

KELP consists of a battery of 11 items of which all but two provide activities to sample ability at the three levels of learning. In the day-to-day work with children the teacher structures experience situations in which the child interacts with the KELP items. The teacher observes and records the successes of the child as he uses the material. Consequently, the teacher is able to determine the cognitive level at which each child is functioning.

The KELP items and the behavioral expectations to attain the various cognitive levels are as follows:

1. Skipping: The child attains success at the association level by skipping on alternate feet.
2. Color Identification: The child attains success at the association level by correctly identifying ten colors which have been taught during typical kindergarten activities.

3. Bead Design: The child attains success at the association level by copying five bead design cards, each having eight or nine beads and two or more repetitions of the pattern. At conceptualization level, the child reproduces one of the designs from memory. Creative self-direction requires he create a design of his own.
4. Bolt Board: The child attains success at the association level by demonstrating the ability to take apart, mix and reassemble the bolt board, a wooden stand having ten holes of diminishing sizes with bolts and nuts to match. At conceptualization level he explains the principles on which he worked. Creative self-direction requires he show his own organization, either in dismantling or in sorting the bolts for assembly.
5. Block Design: The child attains success at the association level by arranging nine colored blocks to match a pattern on which similar blocks are printed. At conceptualization level he does the same task when the pattern is miniaturized and the block outlines are removed. Creative self-direction requires he make a design of his own.
6. Calendar: The child attains success at association level by demonstrating his ability to describe the date or the weather in a complete sentence. At conceptualization level he demonstrates knowledge of the sequence of the days of the week. Creative self-direction requires him to know the social significance of one of the holidays.
7. Number Boards: The child attains success at the association level by demonstrating the ability to count to ten and to recognize the numerals when they are presented in random order, using the plastic pieces of different lengths having the top surfaces embossed with units and the appropriate numeral. At conceptualization level he demonstrates the understanding of the interrelations of the numbers up to five. Creative self-direction requires he independently arrange and develop different groupings of number boards adding up to eight or nine.
8. Safety Signs: The child attains success at association level by reading or dramatizing correct recognition of five of the seven play size safety signs. At conceptualization level, he reproduces a sign from memory. Creative self-direction requires he use the letters available to make words of his own.

9. Printing: The child attains success at the association level by printing his name in manuscript from the teacher's model. At conceptualization level he prints his name with capital and lower case letters without a model. Creative self-direction requires he print words on his own initiative as needed in art or other work.
10. Auditory Discrimination: The child attains success at the association level by identifying with correct articulation the 15 small toys whose names begin with one of three consonants. At conceptualization level he sorts the articles according to beginning sounds. Creative self-direction requires he verbalize other words that begin with the same sound as any of those taught.
11. Social Interaction: The child attains success at the association level by accurately reporting the incidents in a conflict situation. At conceptualization level he must apply in a new situation any of the rules, agreements or standards of behavior in the classroom. Creative self-direction requires he act on the rules he can verbally express.

KELP data obtained from public schools in Washington and Oregon defined what kindergarten children could be expected to achieve in a typical classroom setting. For this study a procedure was needed which tests the abilities of prekindergarten children to achieve these levels of learning. KELP provides this for it gives the teacher immediate feedback on what a child already knows and is able to learn in a school setting. KELP also differentiates between association building and conceptual learning in ways which are observable to the teacher, often without the child having to use language to explain his actions. Although the authors specifically state they have not developed another IQ test such as Binet or WPPSI, they did validate KELP with the Binet. Their data show a positive but

nonsignificant overall total correlation whem compared with chronological age and an overall total correation of .73 when compared with Binet. In analyzing the correlation coefficients the covariance of tasks with the total, the association tasks contribute 35%, the conceptual tasks contribute 35.5% and the creative tasks contribute 29.5% of the total variance. This is evidence each level contributes about one-third to the total variance.

Teacher Reliability Test

A test to verify teacher reliability was used at the end of the study. This test was constructed by the author and consisted of items drawn from the KELP Summary Test Booklet, an instrument which measures cognitive level processes. The KELP Summary Test Booklet, a paper/pencil test, was inappropriate for the subjects in this study. Representative sample of safety signs, vocabulary and number recognition were selected to check reliability at the associative level. Sequencing, auditory discrimination, number relationships and the calendar contributed to samples at the conceptual level. Creative self-direction included samples from social interaction, bead design and block design.

The placement of the representative samples on a 9" x 9" card was fashioned similar to the placement of the pictures on French's Pictorial Test of Intelligence. The response was in the

same manner as for the French, i.e., pointing to the picture determined by the child for his response.

Measures of IQ and MA

Measures were needed to verify that the mental age was comparable to chronological age and to compare achievement of children with traditional measures of IQ. French's Pictorial Test of Intelligence, which produces a measure of IQ; and Ammons and Ammons Full Range Picture Vocabulary Test, which produces a measure of MA were selected.

French's Pictorial Test of Intelligence was selected as one of the measures given to obtain an indication of each subject's IQ. This instrument was selected for its ability to 1) effectively discriminate among subjects of an age range in which the study population fell, 2) provide objective scoring standards requiring minimum of judgements when scoring, 3) require few speaking and manipulative responses by children while measuring verbal comprehension and perceptual organization, 4) permit subjects to demonstrate a level of general intelligence in different ways by performing a variety of intellectual tasks, and 5) be standardized on a sample of children representative of the 3-8 year old population of the United States (French, 1964).

Ammons and Ammons Full Range Picture Vocabulary Test was selected as an added measure to indicate IQ level. This test was chosen for 1) brevity, 2) ease of administering and scoring, 3) the requirement of few speaking and manipulative responses by the subject and 4) its standardization on a representative sample of United States population.

Training of the Teachers

The preservice training consisted of two 2-hour sessions in a workshop setting. The personnel for sites B and C shared a common training session approximately three weeks prior to the beginning of the study in those centers. The personnel at sites A and D received training in separate sessions approximately one week prior to the beginning of the study in those centers. The personnel attending the preservice sessions included the teacher and director of each site. All training sessions were conducted by the researcher.

The first two-hour session consisted of 1) introduction of the material and the learning theory on which it is based and 2) suggestions of observational techniques in the identification of individual needs. The second two-hour session consisted of 1) a demonstration period with five children 4-5 years of age and 2) a discussion of instructional techniques desirable to facilitate the child's interaction

with the material. The demonstration session was utilized to establish reliability of the teacher-observer role. The trainer interacted with the children while all teachers scored the children's level of attainment with the material, these scores were then matched with the trainer's score. The teachers worked in teams of two. One taught and scored the child with which she was interacting, the other observed and scored the same child. After the interaction was completed, the scores were matched with the score of the trainer. This was continued until, no matter which role the teacher assumed, she consistently rated .75 with the trainer in scoring.

On-site inservice sessions were conducted for each teacher during the first six site visitations. The sessions focused on 1) observational techniques which facilitated identification of individual needs, 2) instructional techniques which facilitated the child's interaction with the material, 3) interpretation and clarification of the learning theory on which the material is based and 4) evaluation of the child's interaction and involvement with the material.

Each teacher and the researcher conferred weekly throughout the duration of the study. The conference consisted of 1) discussion of the individual anecdotal records for the purpose of verification of teacher decision, 2) feedback to the teacher on the instructional and observational techniques being practiced and 3) alternative techniques to meet individual needs of the subjects.

Testing Procedures

During the first four weeks of the study French's Short Form and Ammons and Ammons were administered. Testing time for French's is approximately 45 minutes and for Ammons and Ammons 15 minutes is considered adequate.

The tests were administered in separate sessions during the same day to each subject by trained, fully qualified personnel.

The Teacher Reliability Test was administered at the close of the study by the researcher. A random selection of subjects at each site was made. The results of this test were then compared to the observational record of that subject.

Instructional Period

The instructional period of each site was twelve weeks. At each center a 20-30 minute daily interaction with the KELP materials was scheduled. The first 4-6 weeks were spent in introducing and basic instruction of use of the materials. The role of the teacher during the latter portion of the study was of guidance and facilitation rather than formal instruction. It was determined by the study personnel to work in a one-to-one situation three times weekly with each subject, thus cultivating success of interaction with the materials.

The remaining two sessions per week were spent in independent or small group interaction by the subject.

The researcher visited each study site weekly. In addition to conferring with the teacher during each visitation, the researcher also was involved in interaction with the subjects. The purpose of this interaction was 1) as a demonstration of techniques which had been discussed with the teacher during conference and 2) as an informal verification of the teacher's observations, which had also been discussed during conference or had been requested by the teacher.

Comparison Group

The statistics used for comparison were obtained from a group of 133 kindergarten age children in Washington and Oregon. The observations of 1968-70 show a higher level of attainment on KELP material than the original norming group. This is possibly a reflection of a shift of focus to cognitive ability in typical public school kindergartens. The comparison group is considered to be a representative sample of population as they were children attending public schools in this geographic area.

Treatment of the Data

The purpose of this study was to analyze the cognitive processes of the prekindergarten child. The data was collected through the assessment of preprimary skills in a supportive academic setting. In addition, data would yield information regarding sex differences in cognitive processes. Information from the multivariate analysis (Winer, 1962) provided the source of variance. No post hoc comparison, as such, was applied.

The correlation of IQ, MA, and CA with observation scores was made by application of a multiple regression analysis (Winer, 1962).

The reliability test scores were analyzed by use of the Spearman rho method of rank-difference coefficient correlation (Guilford, 1956). The use of the rho method was based on 1) the assumption of a small sample size in its formula and 2) the equivalence of its coefficient to the Pearson r.

The .01 level of confidence was selected in all analysis to ensure against a Type I error. It was of importance to avoid rejecting a hypothesis when it was true.

Summary

A pilot study was conducted for the purpose of perfecting teacher training techniques. The sample for the proposed study was 53 subjects, 42-54 months of age at four study sites.

Over the 12 weeks for the study, site visitations were made weekly by the researcher to conduct inservice sessions and confer with the teacher on the progress and needs of the individual subjects. Data were collected through use of KELP, French's Short Form, Ammons and Ammons and a researcher-made teacher reliability test.

The treatment of the data was through the use of multivariate analysis to determine significance and the source of variance. Correlation of IQ, MA, and CA with observation scores was made through use of a multiple regression analysis. The scores of the reliability test and observational record were analyzed by the rho rank-difference coefficient correlation.

CHAPTER IV

RESULTS OF THE STUDY

The purpose of the study was to analyze the cognitive processes of prekindergarten children and to compare their functioning with kindergarten children. Information regarding cognitive processes was gathered through 1) administration of French's Pictorial Test of Intelligence and Ammons and Ammons Full Range Picture Vocabulary Test, and 2) use of Kindergarten Evaluation of Learning Potential (KELP). The independent variables were age (42-54 months) and sex (male-female). The dependent variables were the levels of learning in KELP (association, conceptualization and creative self-direction).

Analysis of the Data

The analysis of the cognitive process of the prekindergarten child was based on the observation scores recorded by the teacher. These scores were taken from the observational records at the close of the study.

Table 1 presents the F ratio for cognitive processes between male and female prekindergarten children. The F ratio of 7.96

TABLE 1

MULTIVARIATE ANALYSIS OF COGNITIVE PROCESSES FOR PREKINDERGARTEN BOYS AND GIRLS

	Male M	Female M	Total M	df	F ratio	Among MS	Within MS	eta sq
Association	3.33	5.09	4.09	50	7.96*	40.04	5.03	.14
Conceptual	.73	1.30	.98	50	2.39	4.24	1.78	.04
Creative Self-Direction	.17	.52	.32	50	2.62	1.64	.63	.05

*$p < .01$.

indicates that associative learning varied significantly between boys and girls. No significant differences were revealed between prekindergarten boys and girls for conceptualization ($F = 2.39$) or creative self-direction ($F = 2.62$).

The analysis of variance between younger (3 1/2-4 years) and older (4-4 1/2 years) children is presented in Table 2. Significant differences were revealed for associative learning ($F = 9.24$) and for conceptualization ($F = 8.63$). The F ratio of .83 for creative self-direction indicates no significant difference between younger and older prekindergarten children.

Table 3 presents an analysis of variance of cognitive processes as a function of age and sex between kindergarten and prekindergarten children. Significant differences are found in all levels of learning between kindergarten children. The F ratios for age effect (A) in associative learning, conceptualization and creative self-direction were 145.15, 90.14 and 35.16 respectively. Post hoc F ratios attributed to sex effect between kindergarten and prekindergarten children revealed significant differences for associative ($F = 22.24$) and conceptual learning ($F = 3.60$). The interaction between sex and age effect (A x B) was significant for both associative and conceptual tasks ($F = 10.5$ and 5.38 respectively). The interaction was not significant ($F = .71$) for creative self-direction.

TABLE 2

MULTIVARIATE ANALYSIS OF COGNITIVE PROCESSES BETWEEN YOUNGER (3 - 4 1/2 YEARS) AND OLDER (4 - 4 1/2 YEARS) CHILDREN

	Younger	Older	Total	df	F ratio	Among MS	Within MS	eta sq
Association	3.19	5.04	4.09	50	9.24*	45.49	4.92	.15
Conceptual	.48	1.05	.98	50	8.63*	13.74	1.59	.14
Creative Self-Direction	.22	.42	.32	50	.83	.53	.65	.02

*p < .01.

TABLE 3

MULTIVARIATE ANALYSIS OF COGNITIVE PROCESSES AS A FUNCTION OF AGE AND SEX DIFFERENCES BETWEEN PREKINDERGARTEN AND KINDERGARTEN CHILDREN

Source	SS	df	MS	F
		Associative Learning		
A (age)	1914.40	180	807.20	145.15*
B (sex)	2006.72	181	1003.36	22.24*
A x B	2094.09	185	1057.05	10.50*
		Conceptualization		
A (age)	5221.0	186	1610.5	90.14*
B (sex)	1620.26	180	810.13	3.60*
A x B	809.58	181	405.76	5.36*
		Creative Self-Direction		
A (age)	2596.0	186	1298.0	5.27*
B (sex)	949.15	182	474.56	1.97
A x B	1336.56	185	668.76	.71

* p < .01.

Multiple regression correlations of IQ, MA, and CA with total observation scores determined the interrelationship of the independent and dependent variables. These correlations produced an F ratio of 4.13 which is significant at the .05 level. Table 4 presents the post hoc comparisons. Neither the IQ results (2.08) nor the MA results (.21) revealed significant correlations with the total observation score. The CA results (10.13) indicates a significant correlation with total observarion score. These results indicate CA to be a better predictor of success in KELP for the child 42-54 months of age than either IQ or MA.

TABLE 4

MULTIPLE REGRESSION CORRELATION OF IQ, MA, AND CA WITH TOTAL OBSERVATIONAL SCORE

Source	$\overline{X}$	SD	df	F ratio
IQ	109.21	10.12	49	2.08
MA	65.49	15.37	49	.21
CA	47.38	3.98	49	10.13*

*p .01.

An author-made test was administered to check the reliability of the teachers' recorded observations. Results in Table 5 indicate a correlation of .66 between observation scores and investigator reliability check. The data were computed by the Spearman rho (Guilford, 1956) method of rank-difference correlation. The rho of .66, obtained from a population of 20, is regarded as significant at the .05 level of confidence. Since the group tested for reliability is representative of the study population, the results support a reasonable consistency between the teachers' observation records and the reliability check.

TABLE 5

RHO RANK-DIFFERENCE CORRELATIONS OF RELIABILITY CHECK SCORES AND OBSERVATION SCORES

Investigator Reliability	Teacher Observation Scores	R_1	R_2	D	D^2
15	9	1	4.5	3.5	12.25
13	14	2	1	1	1.00
12	12	3	2.5	.5	.25
11	12	4	2.5	1.5	2.25
8	3	5.5	17.5	12	144.00
8	8	5.5	7	1.5	2.25
7	7	8	10.5	1.5	2.25
7	7	8	10.5	1.5	2.25

TABLE 5--Continued

Investigator Reliability	Teacher Observation Scores	R_1	R_2	D	D^2
7	8	8	10.5	1.5	2.25
6	8	11	7	4	16.00
6	8	11	13	2	4.00
6	9	11	4.5	6.5	42.25
5	8	14	7	7	144.00
5	4	14	15.5	1.5	2.25
5	5	14	14	0	0.00
3	3	18	17.5	.5	.25
3	4	18	15.5	2.5	6.25
3	2	18	19.5	1.5	2.25
3	2	18	19.5	1.5	2.25
3	7	18	10.5	7.5	56.25
					444.25

$$= 1 - \frac{6(\quad D^2)}{N(N^{2-1})}$$

$$= .66$$

A report was written by Dr. Dorothy Candland of two site visitations to provide an informal appraisal by an expert in the area of teacher-child interactions. (See Appendix A.) Her appraisal was based on observations of the validity of teachers' judgements relative to associative and conceptual functioning demonstrated by the child. The discussions between the teachers and the researcher of ancedotal records also provided a weekly check on teacher decisions regarding the levels of cognitive functioning. An analysis of variance revealed no significant differences between study sites in performance on KELP material. This further indicates a consistency in recorded observations was maintained by professional personnel at the various sites.

Testing the Null Hypotheses

Hypothesis 1 was confirmed in part in that no significant differences were revealed at the .01 level of confidence between boys and girls in conceptualization and creative self-direction. However, significant differences favoring girls were found in associative learning. Since they out-performed boys in associative type tasks, this may indicate that girls are able to rise above the floor effect at an earlier age than are boys.

Hypothesis 2 was rejected at the .01 level in that significant differences between younger and older prekindergarten children

were found in associative and conceptual learning. This means that fewer 3 1/2 - 4 year old children were able to achieve the behavioral objectives which had been defined as associative and conceptual learning at the kindergarten age. The 4 - 4 1/2 year old children, as a group, were more effective in conceptualizing the cognitive relationships that were built into the kindergarten evaluation. Neither the younger nor the older prekindergarten children made significant numbers of responses at the creative self-direction level, although individual children achieved that level.

Hypothesis 3 was rejected at the .01 level in that kindergarten children outperformed prekindergarten children at all levels of functioning. The 3 1/2 - 4 1/2 year old children were unable to function as effectively as the 5 - 6 year old children on the KELP sequences which teach and evaluate the cognitive processes.

CHAPTER V

DISCUSSION, IMPLICATIONS AND CONCLUSIONS

The investigator's observations of children during several years of classroom teaching convinced her that by age 5 or 6 many children are past "prime" age for enjoying and profiting from traditional kindergarten curriculum. The conviction that the right thing is being expected at the wrong time from some children prompted the decision to conduct a study which would provide data relating to cognitive abilities at an early age.

Philosophical discussion of the relationship between the learner and the environment provided the investigator with historical background for research of associative learning, conceptualization and creative self-direction. The intent of this experiment was to investigate the ability of 3 1/2 - 4 1/2 year old children to function in a learning hierarchy. Curricula in many Early Childhood Education programs are based on generalizations of developmental behavior. Focus of this study was on cognitive abilities of children who were provided an academic environment. The subjects were all systematically exposed to materials through which they could learn and

demonstrate behavior identified through previous research as associative, conceptual or self-direction ability.

The following discussion is organized in terms of data analysis performed, limitations of the study, implications for education, suggestions for future research, summary and conclusions.

Cognitive Processes and Sex Differences

The results of analysis of variance indicated significant differences between prekindergarten boys and girls in associative learning of activities designed for kindergarten children. As indicated earlier significance was revealed for the higher levels of the learning hierarchy. However, the range of total scores, 0-12 for the boys and 1-15 for the girls, showed an overlap of individual learning. This overlap of scores indicates that in individual cases, sex cannot be assumed to determine cognitive ability. A shared variance of 14% between associative learning and sex was indicated by eta square in Table 1. This finding supports the conclusion that individual characteristics, more than sex differences, influenced successful performance in KELP.

The portion of Table 1 labeled Among MS indicated that performance varied between boys and girls. Within MS, a measure of homogeneity achieved within each group, and the overlap of ranges indicates that many boys achieved equal to, and in several cases, surpassed the achievement of many girls.

The histograms in Table 6 present the responses for boys and girls in associative tasks. Generally speaking, the pattern of achievement is similiar between the two groups. The key items which contributed to the significant difference between boys and girls were bead and block designs, number boards and safety signs. The nearly equal ability between the two groups in skipping is in contrast to the traditionally held expectations of boy behavior during the primary grades.

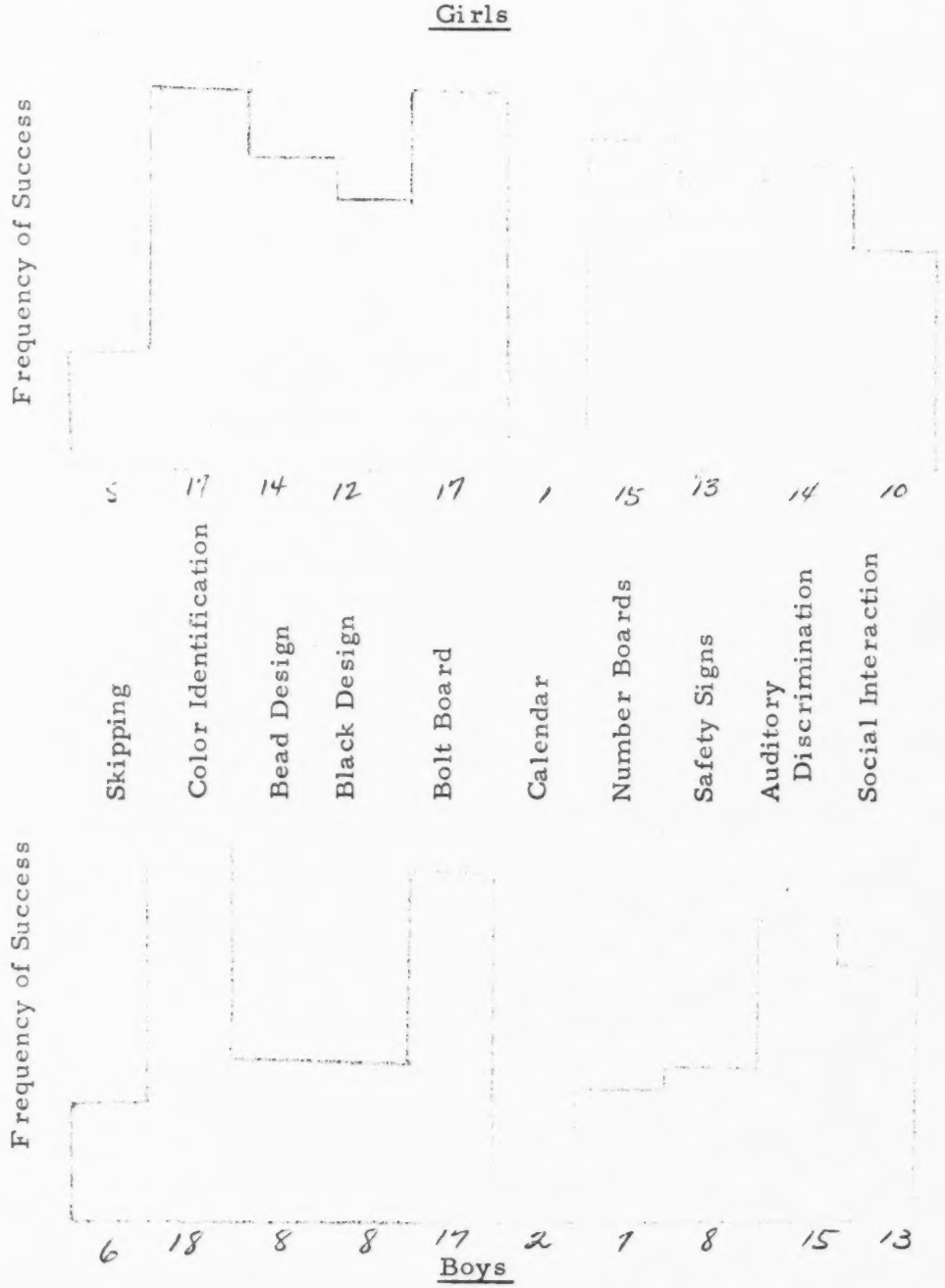
Factors contributing to these differences are probably both cognitive and affective including the sex role expectancy. The relatively quiet home behavior of girls, being more aligned to school behavior than that of boys, could also be a contributing factor. The possibility that girls found more enjoyment in KELP activities, therefore returned and perservered more than boys, is also a consideration. It is a possibility that girls were the focus of different expectancies from teachers than boys were. All the professional personnel holding responsibilities and expectations, including the investigator, were female.

Cognitive Processes and Age

As reported in Chapter IV the kindergarten children performed significantly better at association learning, conceptualization and creative self-direction ($p = .01$) with age as the variable. These

TABLE 6

HISTOGRAM COMPARING ASSOCIATIVE RESPONSES OF KINDERGARTEN BOYS AND GIRLS



results were not unexpected since this comparison was made to establish the spread of individual differences which could be expected between groups of this age range. The material utilized in this study was designed originally to evaluate cognitive processes of the 5-6 year old child. The vertical (levels of learning) and the horizontal (variety of items) range in KELP provides opportunity for successful learning for the kindergarten child. Generally speaking, the older children, for whom the material was designed, achieved about two-thirds the number of conceptual as associative tasks and about one-third the number of self-direction as associative tasks. This ratio on vertical levels of learning did not transfer to prekindergarten children where the achievement on conceptual tasks was only about one-fourth that of association learning, and creative self-direction was shown only about one-tenth as frequently as associations.

One possible conclusion could be that predictions cannot be assumed of prekindergarten achievement from data provided by kindergarten children using the same material. The nature of sequences geared to kindergarten can be assumed to be too difficult for many prekindergarten children, especially those under 4 years of age. However, success in KELP items can be anticipated for many prekindergarten children, especially the 4 - 4 1/2 year old children.

Within the experimental group, Table 2 presents the data comparing the younger and older children. The portion of the table labeled Among MS indicates that performance varied between groups as a function of age. This variance was about three times greater at association than at conceptual level, although there was significance at both levels. The range of total scores was 0-11 per subject for the younger group and 1-15 per subject for the older group. The overlap of ranges for the two groups may indicate an evolution of conceptual ability.

The histogram in Table 7 presents the responses of younger and older prekindergarten children in associative tasks. Generally speaking, the same tasks provided opportunities for success in both groups, however, the older group had less fluctuation across all items than did the younger group.

The stability of achievement across items is more evident at the conceptual level (Table 8). At 3 1/2 - 4 years most children were beginning to develop the ability to conceptualize the imbedded relationships, therefore relatively few criterion performances were observed above the floor level on conceptual tasks. By age 4 - 4 1/2 years the ability to conceptualize is established in greater numbers of subjects. The older group was able to perform significantly better on both associative and conceptual learning, which would indicate that older children had physical and cognitive abilities beyond those of the

TABLE 7

HISTOGRAM COMPARING YOUNGER AND OLDER PRE-KINDERGARTEN CHILDREN IN ASSOCIATIVE TASKS

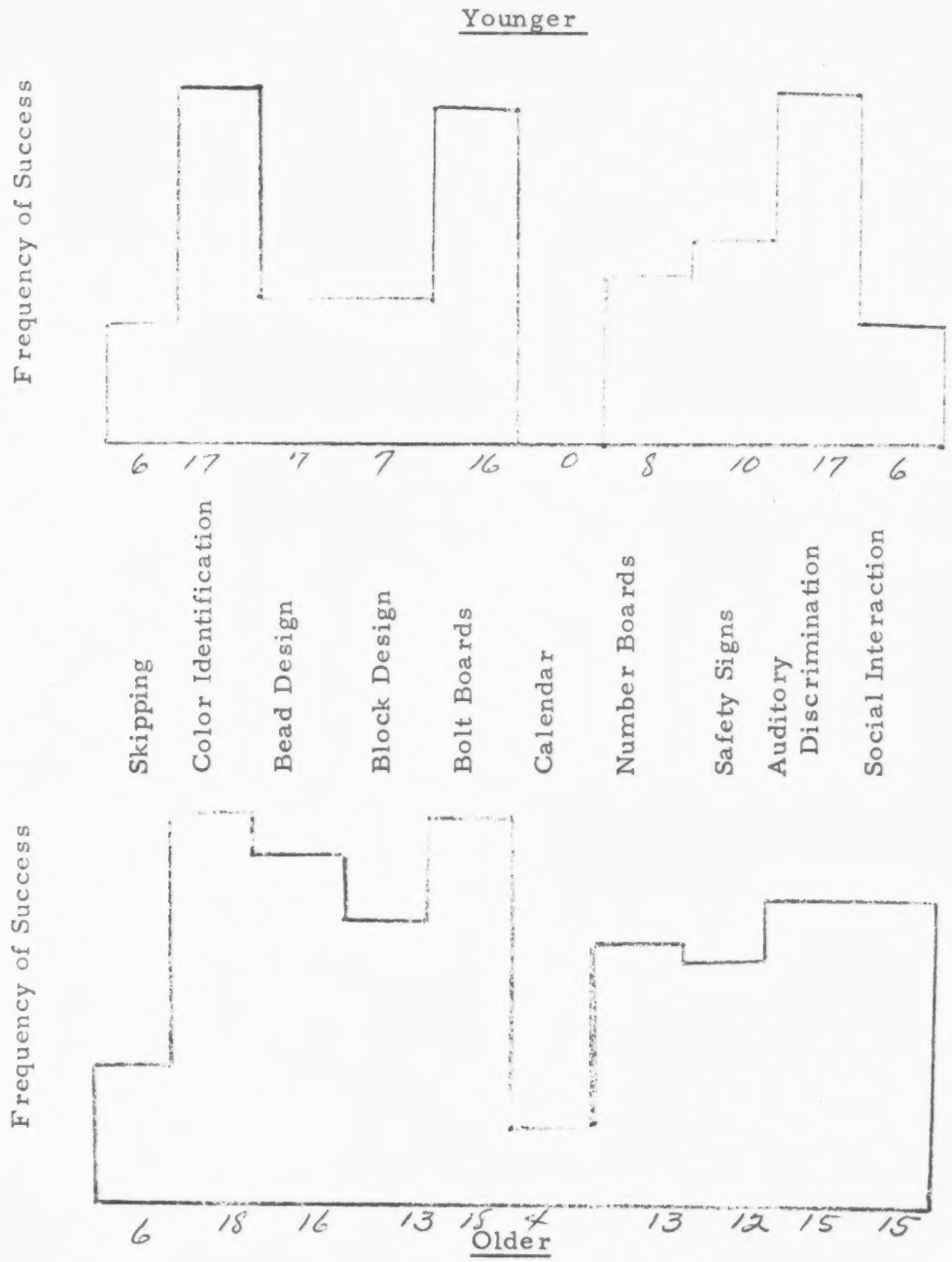
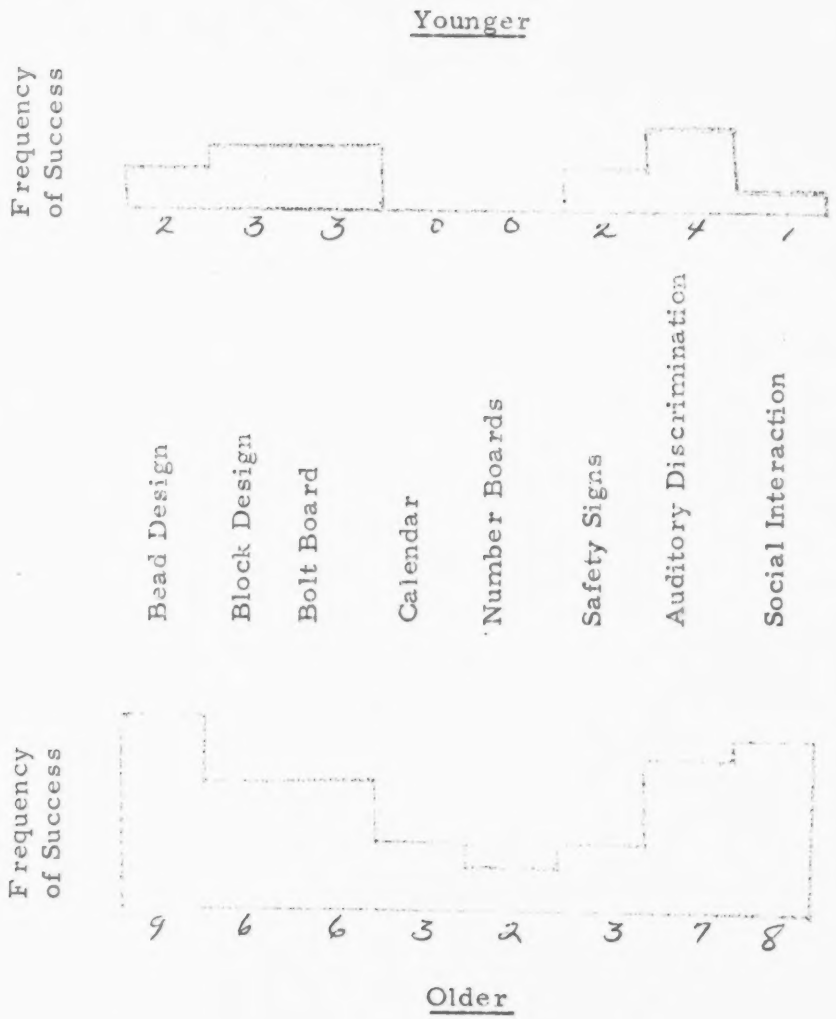


TABLE 8

HISTOGRAM COMPARING YOUNGER AND OLDER PRE-KINDERGARTEN CHILDREN IN CONCEPTUAL TASKS



younger child. Generally speaking, the older child had the physical ability to attend for longer periods of time and had the cognitive ability to achieve at a higher level on the learning hierarchy.

During the study the investigator observed differences between younger and older prekindergarten children regarding their interaction patterns. Many 3 1/2 - 4 year old children preferred to interact with another individual rather than with concrete material. Among apparent priorities for this age group were talking, touching, sharing time and receiving attention of fellow humans. Interaction with KELP materials, in many cases, appeared to be only a vehicle through which these youngsters could capture the undivided attention and time of an adult. Generally speaking, the younger child interacted with KELP for a purpose other than KELP related, it provided a means to an end.

In contrast, many 4 - 4 1/2 year old children appeared to become involved in exploring and investigating an item, with the interaction taking on a direction and purpose for the individual. For many older prekindergarten children the interaction with KELP was not a means but rather an end. Consequently, the older children attended for longer periods of time and attained higher on the learning hierarchy.

Correlation of Total Score, IQ, MA and CA

The correlations of IQ and MA with total KELP scores were not significant, but the correlation of CA item success was significant at the .01 level. Wilson and Robeck (1964) on a correlation of IQ, MA, and CA with total score for the original norming group of KELP, found that MA was a better predictor of success than either CA or IQ at kindergarten age. These different results in two age groups can be explained by the nature of the sequences designed for the older group. Being too difficult for many prekindergarten children this floor effect tended to contribute to low correlations when IQ and MA are analyzed. Teacher's expectation based on age of the child, rather than on IQ or MA, could further influence the child's performance in favor of CA.

Limitations of the Study

The findings of the study should be considered within the following limitations.

1. The data were gathered over a 12 week period which is a relatively brief time for measurable change in cognitive processes of the 3 1/2 - 4 1/2 year old child.

2. The initiation of the study coincided with the opening of the academic year at each site, before school routines had been

established. The children were expected to focus on different goals.

3. These programs were the first away-from-home experience for more than half the subjects in the study.

Implications for Early Childhood Education

Curriculum in Early Childhood Education may be defined as the experiences organized to provide learning for young children in a school setting. These opportunities may be presented by direct teaching or by a loosely structured learning environment. Apt goals for the direct teaching approach are visual and auditory discrimination skills, expansion of sensory awareness and premath and prescience skills. Goals which are, for the most part, taught in a loosely structured learning environment include affective skills.

Direct teaching is possible through several methods, including play situations, group interaction or teacher-pupil interaction. With defined behavioral objectives in mind, the teacher can observe and cultivate cognitive development. Such preacademic skills as familiarity with print and knowledge of letter and color names can be directly taught by a variety of games or in play situations. These visual and auditory discrimination skills enhance success in the reading program.

The expansion of sensory awareness is achieved by involving children in a planned curriculum of perceptual activity. Sensory awareness can be expressed through arts, crafts, music, drama, physical education and group interaction. Provision of a diversity of commercial and teacher-made materials with ample time to "mess around," explore and experiment is a means of establishing basic observation skills.

Premath skills which provide opportunity for number conservation are important in the curriculum. Situations which involve experiences in sets and grouping, one-to-one correspondence, number operations (more, less, equal), and spacial and dimensional relationships are recommended activities in the preschool day.

Loosely structured experiences provide an appropriate method for teaching those concepts which are not adapted to direct teaching. Situational and incidental learning is included in this portion of the curriculum.

The basic social values are effectively taught in the school setting. These values include concern for the worth of the individual, concepts of freedom and responsibility, the importance of involvement in decision making and concern for the safety of persons and property. These values are not usually taught directly as are preacademic skills, but are usually inferred from the behavior of significant adults in the lives of young children. Modeling and imitation of adults occurs from

inferential conceptualizations as a result of constant and continued association and interaction.

Preacademic curriculum for children of less than 4 years of age must be designed with different expectations than for kindergarten children. Prior to 4 years children can profit from play situations in which academic notions are fostered. Many children beyond 4 years of age can profit from an enjoyable atmosphere in which skills are directly taught in addition to group play situations.

Generally speaking, directors and teachers of day care and nursery schools have backgrounds in physical and social development of children. Additional background in perceptual, cognitive and affective development would prove valuable for ensuring a rich experience for children.

Suggestions for Future Research

Research is needed in Early Childhood Education to provide data for many questions yet unanswered. The following suggestions are only a few of the possibilities in this area.

The most obvious need if longitudinal investigation of the functioning of children 3-6 years of age. An investigation of this magnitude would supply data which could pinpoint the ages of ability to conceptualize preacademic learning.

Statistically there was no correlation between IQ and the total observational score. An informal scanning of the raw data provided no pattern as to the connection of IQ or MA with total score. This was supported by observation of the subjects throughout the study. Research is needed of motivational patterns which support successful performance in the prekindergarten years.

The significant difference between boys and girls at associative learning could be an artifact of cultural expectations. Statistically boys did not achieve as well as girls, which could be attributed to 1) boys lag cognitively when compared to girls or 2) boys lag in performance, but not cognitively, when compared to girls. Further research of maturation, motor control, and motivation could establish which of these alternatives cause this difference and preschool programs could then be designed and evaluated in light of the findings.

Research and development of an instrument designed to identify cognitive processes in prekindergarten children should be undertaken.

Finally, it would be appropriate to replicate this study using males in the teacher role.

Summary

Research in child development indicates that the period of very rapid learning occurs from birth to about five years of age. This study provided data which further identified the cognitive processes that are possible at this age, and the extent to which children organize their sensory experience into concepts.

The sample for the study consisted of 53 children 42-54 months of age at four study sites. The sample was representative of preschools in the state of Oregon and fell within expected socio-economic ranges on Warner's Index of Status Characteristics.

Kindergarten Evaluation of Learning Potential (KELP) by Wilson and Robeck was used to explore the associative and conceptual processes of the subjects. French's Pictorial Test of Intelligence and Ammons and Ammons Full Range Picture Vocabulary Test were used to measure intelligence quotient (IQ) and mental age (MA). An author-made test was used to verify reliability of teacher observations.

Training of the professional personnel was conducted in one preservice and six on-the-site sessions. During the 12 week experiment a 20-30 minute period was scheduled daily in which children interacted in small groups with KELP materials.

No significant differences were revealed between boys and girls in conceptualization and creative self-direction, however, significance favoring girls was revealed in associative learning. Significant differences between younger and older prekindergarten children were found in association and conceptual learning, with no conclusions drawn on creative self-direction functioning due to an insufficient number of responses. It was found that kindergarten children outperformed prekindergarten children at all levels of functioning on KELP.

The major implication of this study is that the prekindergarten children became effective at about age 4 in conceptualizing the cognitive relationships that were built into the kindergarten evaluation.

Conclusions

1. Cognitively, 3 1/2 - 4 1/2 year old children as a group do not function on the level of sophistication achieved by the 5-6 year old children.

2. Significant differences exist between prekindergarten boys and girls in achievement on associative tasks as defined in KELP.

3. Ability to conceptualize prekindergarten tasks is significantly better established at age 4 1/2 years than at 4 years.

4. Individual performance of prekindergarten and kindergarten overlaps, indicating a need for extending cognitive opportunities to younger years.

APPENDIX A

Report on Site Visitation for

"LEARNING ABILITIES OF THE PRE-KINDERGARTEN CHILD"

December 15, 1971 -- Project Director: LeOra L. Cordis

Sites: Two Nursery Schools, Beaverton - Portland Area

Observations at Site Number One.

Site Number One is a most attractive complex, obviously designed to serve as enabling facilities for carefully thought out programs for young children. The building area that housed the 3-4-5 year olds was spacious, combining outdoor and indoor learning centers with multi-level areas equipped for both small, informal groups and larger gatherings. Children moved freely from one area to another, but it was not completely unstructured. The three individuals that were responsible for the group each appeared to have arranged a particular part of the environment to invite active involvement of the children. The total effect was one of eager exploration - with little or no evidence of undue tensions or aggression.

The teacher who was using the KELP materials appeared to be ideally suited for her role as facilitator and supporter of learning. She was open, warmly accepting and congruent in her relationships with children and obviously enjoyed what she was doing. In working with the experimental group, she was relaxed and at the same time

able to communicate a belief in what she was doing and her confidence in the children's ability to perform the KELP tasks. At any rate, an assessment of the social-emotional climate index, using Withall's technique, revealed a highly supportive learning atmosphere. (SEC = 80.41 for the experimental group)

When the Researcher and the teacher took the experimental group from the others to use the KELP materials, the children responded positively. One boy did express some discouragement with the bolt board, and after trying several times, he exclaimed, "I still can't do it!" The teacher did not insist that he persevere at this point but permitted him to select another activity. She skillfully asked questions or made suggestions that seemed to help her determine which level of learning the child was demonstrating at a particular moment. The teacher and the Researcher talked over some of the performance clues, and appeared to be in agreement.

Observations at Site Number Two.

Site Number Two is a remodeled home in a fairly crowded area. Although the rooms were limited, good use was made of all available space. The playground had some suitable equipment, but was inadequate in total space and lawn or turfed areas. The school appeared to be overcrowded except for the large rooms where the 3-4-5 year olds containing the experimental group were housed.

The teacher at Site Number Two was eager to cooperate with the Researcher and to demonstrate her ability with the class. We observed her with the total group in a structured situation with clay. The children seemed to be happy and relaxed but not particularly challenged. When the teacher took the experimental group into a smaller room to work with the KELP materials, they started in without any hesitation to play with block designs, beads, number pieces, bolt board and traffic signs. One child had selected the "W" for WALK when she happened to turn it upside down. She seemed pleased to discover that it made an "M" and chanted to herself, "Now it's an M," then turning it upright again, "Now it's a W." The teacher observed this, smiling, and made a remark about the beginnings of creative learning. I did have the impression that this teacher was rather tense and concerned about the overt evidence of mastery of the manipulation of the KELP materials. Her reaction to the inverted W indicated, however, that she was aware of the differences between the three levels of learning. When I did a Withall Social-Emoticnal Climate Index on her, her SEC score was 88.12 (very supportive).

Summary

It was obvious that excellent rapport existed between the Researcher and the cooperating nursery teachers. A sense of

mutual respect and trust was evident between them, and between the Researcher and the pupils. In both instances the teachers and children seemed to feel at home with the KELP materials - indicating an effective orientation - and follow up on the part of the Researcher.

Observer: Dorothy N. Candland, Professor
College of Education
University of Oregon

APPENDIX B

Committee for the Protection of Human Rights
Office of Scientific and Scholarly Research
Graduate School
University of Oregon

re: Learning Abilities of the Pre-Kindergarten Child

The purpose of the proposed 12 week study is to assess the learning of preprimary skills on the part of children 42-54 months of age.

The material to be used is a loosely structured program which sequences experiences of association learning, building a basis for conceptualization and thus on to creativity. Day care and nursery school personnel, trained to make accurate observations will record the childrens' performances. These scores will be analyzed to determine the level of learning attained. Ammons and Ammons Wide Range Vocabulary Test and French's Pictoral Test of Intelligence will be administered, these scores will be compared to the observational scores. All scores will be coded and the master code will be placed in a locked file.

The proposed study will take place in nursery schools and day care centers in the Beaverton-Portland, Oregon area. The director of each site participating in the study has interviewed the researcher and has agreed to cooperate in the study.

The physical and psychological risks to the child are minimal, for the experimental portion consists of interacting with manipulative material which is common in pre-school settings. Information sought on each child will be that which is kept in open file at each participating study site. Information which will be disseminated will be total study population attainments and not individual attainments; thus the subjects' right to privacy and anonymity will be protected.

LeOra L. Cordis
Graduate Fellow
Curriculum & Instructional Dept.
College of Education
University of Oregon

Dear Parent,

In conjunction with LeOra Cordis, Graduate Fellow of the University of Oregon, we are participating in a 12 week study to assess the learning of preprimary skills on the part of children 42-54 months of age.

The material to be used is a loosely structured program which sequences experiences of association learning, building a basis for conceptualizations and thus on to creativity. The personnel in our center will record each child's performance; these scores will be analyzed to determine the level of learning attained. Ammons and Ammons Wide Range Vocabulary Test and French's Pictorial Test of Intelligence will be administered, these scores will be compared to the observational scores. All scores will be coded and the master code will be placed in a locked file.

Your child's participation is voluntary and, if you so wish, he may discontinue participation at any time.

_____
Director

_____
Researcher

- -

I have received information concerning the 12 week study being conducted in the pre-school center which my child attends.

I give my consent for my child to participate in the study, with the understanding that he may discontinue participating at any time if we do wish.

_____
Parent or Guardian

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